swan
ANALYTICAL INSTRUMENTS

AMU Pharmacon

Version 6.21 and higher

Operator's Manual

A-96.250.691 / 230320

Customer Support
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Table of contents

AMU Pharmacon - Operator's Manual

This document describes the main steps for instrument setup, operation and maintenance.

1. Safety Instructions

General

The instructions included in this section explain the potential risks associated with instrument operation and provide important safety practices designed to minimize these risks.

If you carefully follow the information contained in this section, you can protect yourself from hazards and create a safer work environment.

More safety instructions are given throughout this manual, at the respective locations where observation is most important.

Strictly follow all safety instructions in this publication.

Target audience

Operator: Qualified person who uses the equipment for its intended purpose.

Instrument operation requires thorough knowledge of applications, instrument functions and software program as well as all applicable safety rules and regulations.

OM Location

The AMU Operator's Manual shall be kept in proximity of the instrument.

Qualification, Training

To be qualified for instrument installation and operation, you must:

- read and understand the instructions in this manual as well as the Material Safety Data Sheets.
- know the relevant safety rules and regulations.

1.1. Warning Notices

The symbols used for safety-related notices have the following significance:

DANGER

Severe injuries or death will result if such warnings are ignored.

- Follow the prevention instructions carefully.

WARNING

Severe injuries or damage to the equipment can occur if such warnings are ignored.

- Follow the prevention instructions carefully.

CAUTION

Damage to the equipment, minor injury, malfunctions or incorrect process can be the consequence if such warnings are ignored.

- Follow the prevention instructions carefully.

Mandatory Signs

The importance of the mandatory signs in this manual.

Safety goggles

Safety gloves

Warning Signs The importance of the warning signs in this manual.

Electrical shock hazard

Corrosive

Harmful to health

Flammable

Warning general

Attention general

1.2. General Safety Regulations

Legal Requirements

The user is responsible for proper system operation.
All precautions must be followed to ensure safe operation of the instrument.

Spare Parts and Disposables

Use only official SWAN spare parts and disposables. If other parts are used during the normal warranty period, the manufacturer's warranty is voided.

Modifications

Modifications and instrument upgrades shall only be carried out by an authorized Service Technician. SWAN will not accept responsibility for any claim resulting from unauthorized modification or alteration.

WARNING

Risk of Electrical Shock

If proper operation is no longer possible, the instrument must be disconnected from all power lines, and measures must be taken to prevent inadvertent operation.

- To prevent from electrical shock, always make sure that the ground wire is connected.
- Service shall be performed by authorized personnel only.

WARNING

For safe instrument installation and operation you must read and understand the instructions in this manual.

WARNING

Only SWAN trained and authorized personnel shall perform the tasks described in this document.

2. Product Description

This instrument is applicable for the measurement of conductivity in purified water and water for injection of pharmaceutical water.

2.1. Description of the System

Application range

The conductivity is a parameter for the total quantity of ions present in the solution.

The AMU Pharmacon transmitter together with the two-electrode In-line sensor Pharmacon NPT or Pharmacon SAN is used for applications in:

- purified water (PW)
- water for injection (WFI)

Measuring principle

The sensor is immersed in the liquid. It is connected to the AMU transmitter which supplies the sensor with alternating voltage. The AMU transmitter measures the strength of the electrical signal between the electrodes which is linearly related to the conductivity. Alternating current is used in order to reduce polarization effects. These can be caused by ions either attracting or rejecting electrons and reverting to their molecular form. The result is a “screened” electrode, which rapidly reduces the current flow and leads to wrong measured values. By applying an alternating voltage, the capacities are repeatedly discharged and the polarization effect is largely eliminated.

The temperature sensor is incorporated in order to adjust the reading to that of the standard temperature (usually 25 °C).

Temperature compensation

- None
- Coefficient: in %/°C
- Neutral salts (NaCl)
- High purity water (non-linear)
- Strong acids
- Strong bases
- Ammonia, ethanolamine
- Morpholine

Standard temperature

The displayed conductivity value is compensated to 25 °C standard temperature.

Measurement value
The compensated- (tc), the uncompensated value (uc) and the actual USP alarm value can be displayed.

USP<645>
Alarm function for limit values according to USP<645> Stage 1. By editing the Limit (100 % to 20 %) an action limit can be set.

Transmitter test
Check the correct function of the transmitter using high precision resistors (available as accessory).

Cell constant
A label indicating all necessary parameters is glued on the sensor. Please enter the data in Installation, menu 5.1.

Sensor connection
Sensor connections for a two-electrode sensor with built-in Pt1000 temperature probe like Swansensor Pharmacon and for an optional digital sample flow meter.

Signal outputs
Two signal outputs programmable for measured values (freely scaleable, linear or bilinear) or as continuous control output (control parameters programmable).

Current loop:	0/4–20 mA
Maximal burden:	510 Ω

Relay
Two potential-free contacts programmable as limit switches for measuring values, controllers or timer for system cleaning with automatic hold function.

Maximum load:	100 mA/50 V

Alarm relay
One potential free contact. Summary alarm indication for programmable alarm values and Instrument faults.

Available in two configurations:

- Normally open*: Closed during normal operation, open in case of error or power loss.
- Normally closed: Open during normal operation, closed in case of error or power loss

*Standard configuration. To order the version with normally closed alarm relay, contact your dealer in advance.

Maximum load: 100 mA / 50 V

Input
For potential-free contact to freeze the measuring value or to interrupt control in automated installations (hold function or remote-off).

Safety features
No data loss after power failure. All data is saved in non-volatile memory. Over voltage protection of in- and outputs. Galvanic separation of measuring inputs and signal outputs.

Communication interface
- RS232 for logger download with HyperTerminal
- RS485 with Fieldbus protocol Modbus or Profibus DP (optional)

2.2. Single Components

2.2.1 Transmitter AMU Pharmacon

The AMU measuring and control transmitter is used for panel installation. It has connections for a two-electrode conductivity sensor with a built-in Pt1000 temperature probe, e.g. Swansensor Pharmacon SAN, and for a digital sample flow meter.

General	Electronics housing:	Noryl® resin
	Protection degree:	IP54 (front)
	Ambient temperature	-10 to +50 °C
	Humidity:	10–90 % rel., non condensing
	Display:	backlit LCD, 75 x 45 mm
	Dimensions:	96x96x120 mm (DIN 43700)
	Weight:	0.45 kg
Power supply	Voltage:	100–240 VAC (±10%) 50/60 Hz (±5%) or 24 VDC (±15%)
	Power consumption:	max. 8 VA
Measurement range	Conductivity:	0.005 to 2000 µS/cm with automatic range switching

2.2.2 Swansensor Pharmacon

Two-electrode conductivity sensor for the **inline measurement** of purified water and water for injection of pharmaceutical water.

Available in two different models:

- Swansensor Pharmacon SAN, with sanitary flange
- Swansensor Pharmacon NPT, with NPT ¾" thread

Swansensor Pharmacon SAN

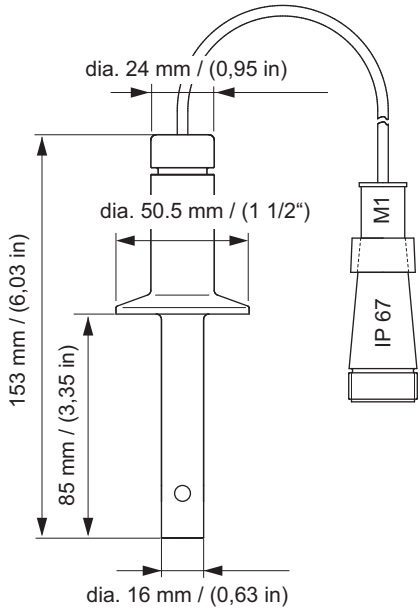
Polished surface, no dead volume.
Equipped with fixed cable (~30cm, PTFE) with M16 male plug.

Sensor will be accompanied with following certificates:

- Cell constant,
- Material specification
- Inspection certificate according to EN 10204, surface roughness with SS Pharmacon SAN.

Specifications	Measuring range:	0.055–1'000 µS/cm
	Accuracy (at 25°C):	±2% up to 500 µS/cm ±3% above 500 µS/cm up to 1'000 µS/cm
	Cell constant:	0.1 cm^{-1}
Material:	Shaft & Electrode:	SS 316L (1.4435) stainless steel
	Isolator:	PEEK
	Roughness:	R_a < 0.4 µm
	Temperature sensor:	Pt1000, accuracy ±0.2 °C
	Sensor mounting:	sanitary flange 1 ½"
	Operating temperature:	-10 to +120 °C
	Sterilization temp.:	-10 to +155 °C
	Operating pressure:	17 bar at 25 °C, max. 7 bar at +95 °C

Dimensions	Total length:	153 mm
	Insertion length:	85 mm



Swansensor Pharmacon NPT

Polished surface, no dead volume.
Equipped with fixed cable (~30cm, PTFE) with M16 male plug.

Sensor will be accompanied with following certificates:

- Cell constant,
- Material specification
- Inspection certificate according to EN 10204 (surface roughness with SS Pharmacon NPT).

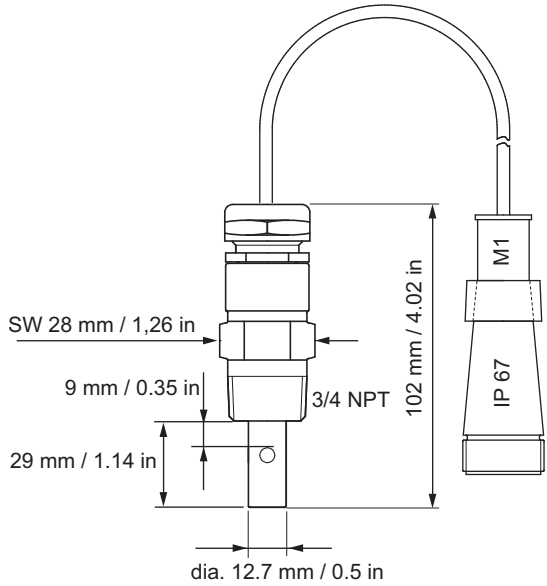
Specifications

Measuring range	0.055 – 1'000 µS/cm
Accuracy (at 25°C):	±2% up to 500 µS/cm
:	±3% above 500 µS/cm up to 1'000µS/cm
Cell constant:	0.1 cm^{-1}

Material:

Shaft & Electrode:	SS 316L (1.4435) stainless steel, Titan
Isolator:	PEEK
Roughness:	R_a < 0.4 µm
Temperature sensor:	Pt1000, accuracy ±0.2 °C
Sensor mounting:	NPT thread ¾"
Operating temperature:	-10 to +120 °C
Sterilization temp.:	-10 to +155 °C
Operating pressure:	17 bar at 25 °C, max. 7 bar at + 95 °C

Dimensions	Total length:	102 mm
	Insertion length:	29 mm

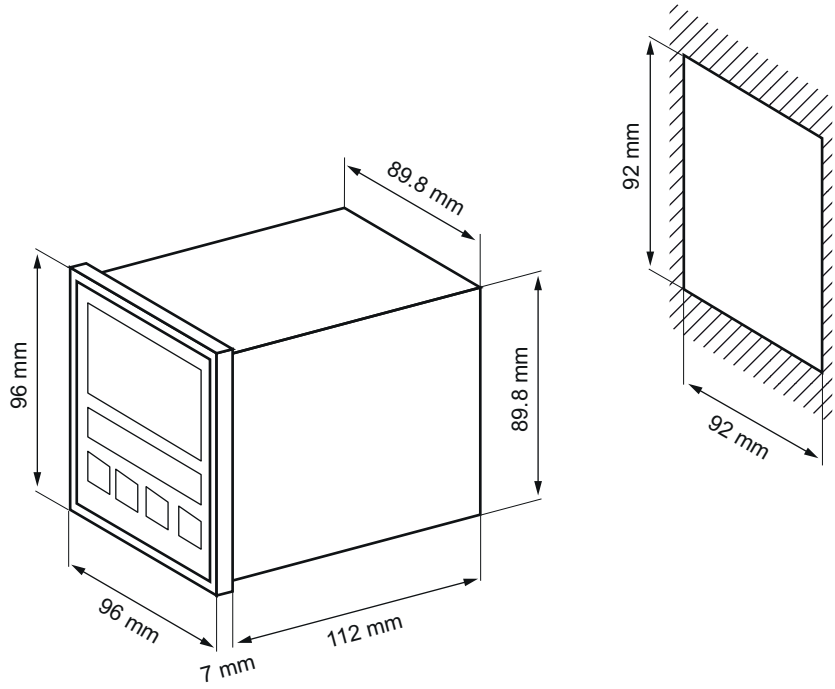


3. Installation

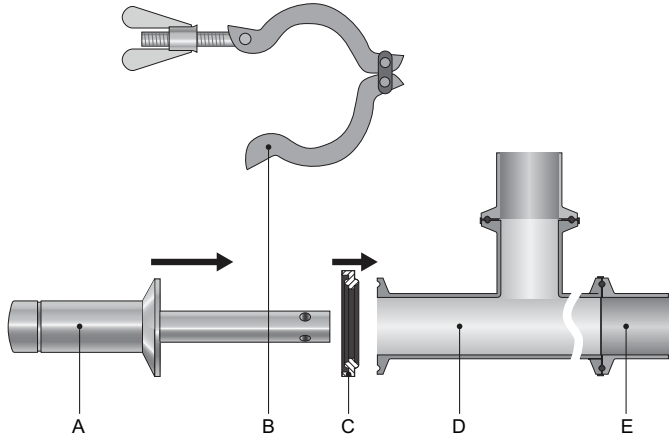
3.1. Installation Check List

Check	Instrument's specification must conform to your power ratings. Do not switch on power until all external devices are connected.
Installation	The transmitter is intended for panel mounting. The dimensions are shown in Dimensions of the AMU Transmitter, p. 15.
Electrical Wiring	Connect all external devices, see Connection Diagram, p. 20. Connect the power cord, but do not switch on power until all external devices are connected.
Power-up	Switch on power
Instrument Setup	Program all sensor specific parameters (cell constant, temp. correction, cable length). Program all parameters for external devices (interface, recorders, etc.). Program all parameters for instrument operation (limits, alarms). Activate Quality Assurance if required Activate USP mode and its limit if required
Run-in period	Let the instrument run continuously for 1 h.

3.2. Dimensions of the AMU Transmitter



3.3. Install the Swansensor Pharmacon SAN

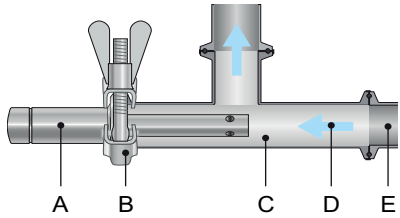


A *Swansensor Pharmacon SAN*
B *Clamp*
C *Gasket*
D *T-Pipe*
E *Pipe*

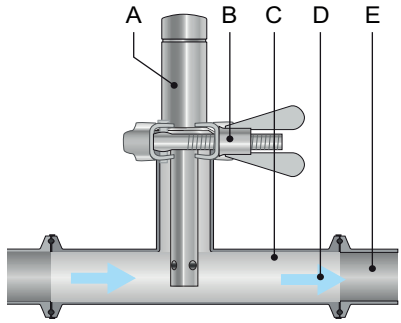
To install the Swansensor Pharmacon SAN into a pipe flange proceed as follows:

1 Make sure, that the surface of the T-Piece flange [D] is clean.
2 Put the gasket [C] onto the flange.
3 Insert the Swansensor Pharmacon SAN into the T-Piece [D].
4 Install the clamp [B] and tighten it well.

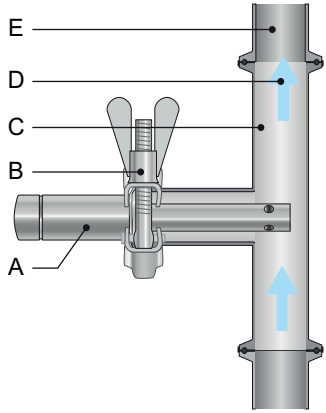
Recommended Installation



The flow direction should be towards the sensor tip. This avoids air or solids becoming trapped in the sensor.



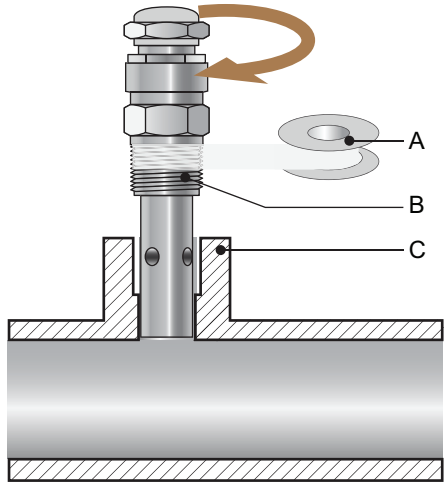
Vertical installation is possible if the pipe is always full and no air can be trapped between the electrodes.



Install the sensor in a vertical pipe with upward flow direction.

A *Swansensor Pharmacon SAN*
B *Clamp*
C *T-piece*
D *Flow direction*
E *Pipe*

3.4. Install the Swansensor Pharmacon NPT



A *Teflon tape*
B *Swansensor Pharmacon NPT*
C *Flange*

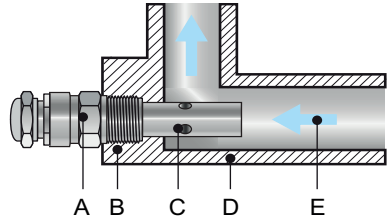
To install the Swansensor Pharmacon NPT into a pipe flange proceed as follows:

1 Wrap 7 turns of teflon tape around the sensor thread.

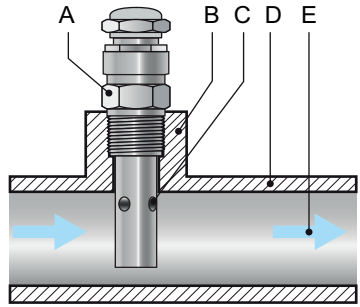
2 Screw the sensor into the pipe flange.

3 Tighten the sensor well with an 28 mm open-ended spanner.

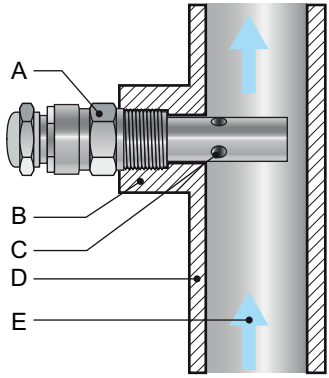
Recommended Installation



The flow direction should be towards the sensor tip. This avoids air or solids becoming trapped in the sensor.



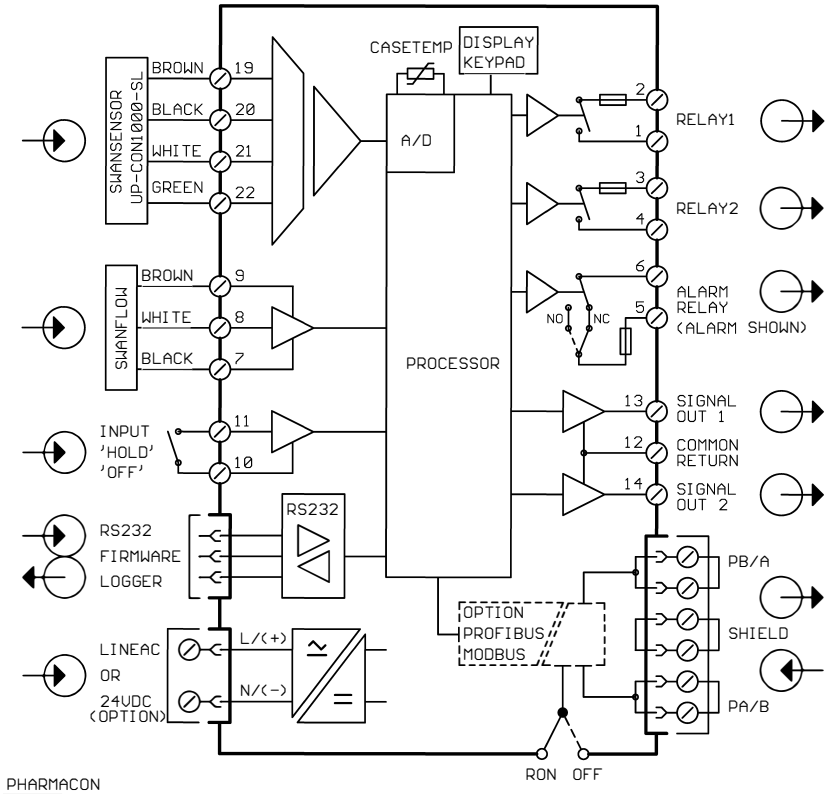
Vertical installation is possible if the pipe is always full and no air can be trapped between the electrodes.



Install the sensor in a vertical pipe with upward flow direction.

A *Swansensor Pharmacon NPT*
B *Flange*
C *Air holes*
D *Pipe*
E *Flow direction*

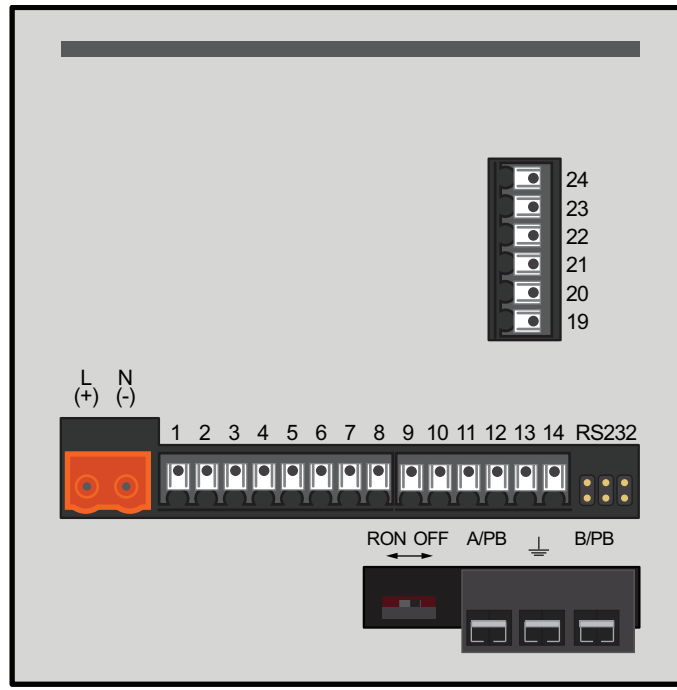
3.5. Connection Diagram



CAUTION

Use only the terminals shown in this diagram, and only for the mentioned purpose. Use of any other terminals will cause short circuits with possible corresponding consequences to material and personnel.

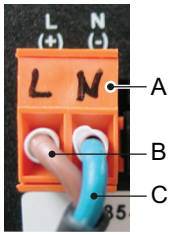
Rear view AMU Transmitter



3.6. Power supply

CAUTION

Do not apply power to the transmitter until all electrical connections are made.



A *Power supply connector*
B *Phase conductor*
C *Neutral conductor*

Installation requirements

The installation must meet the following requirements:

- Mains cable to comply with standards IEC 60227 or IEC 60245; flammable rating FV1
- Mains equipped with an external switch or circuit-breaker
  - near the instrument
  - easily accessible to the operator
  - marked as interrupter for AMU Powercon

3.7. Sensor

Connect the sensor to the AMU transmitter according to the connection diagram, see Connection Diagram, p. 20.
Sensor settings see Programming, p. 26.

3.8. Flow Meter

Connect the flow meter (if any) to the AMU transmitter according to the connection diagram, see Connection Diagram, p. 20.

3.9. Input

NOTICE: *Use only potential-free (dry) contacts.*

Terminals 10/11
For programming see Program Overview, p. 38.

3.10. Relay Contacts

3.10.1 Alarm Relay

NOTICE: *Max. load 100 mA/50 V*

Alarm output for system errors. Error codes see Error List, p. 35.

	Terminals	Description
NC [a] Normally Closed	5/6	Opened during normal operation. Closed on error and loss of power.
NO [a] Normally Open	5/6	Closed during normal operation. Opened on error and loss of power.

a) As defined when ordering

3.10.2 Relay 1 and 2

NOTICE: *Max. load 100 mA/50 V*

Relay 1: Terminals 1/2
Relay 2: Terminals 3/4

For programming see Program List and Explanations, p. 43, menu Installation

3.11. Signal Output 1 and 2 (current outputs)

NOTICE: *Max. burden 510 Ω*
If signals are sent to two different receivers, use signal isolator (loop isolator).

Signal output 1: Terminals 13 (+) and 12 (-)
Signal output 2: Terminals 14 (+) and 12 (-)

For programming see Program List and Explanations, p. 43, menu Installation.

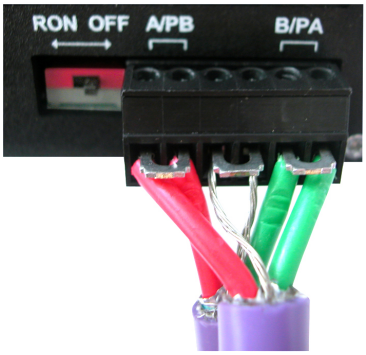
3.12. Interfaces

3.12.1 RS232 Interface

The interface RS232 is on the backside of the AMU transmitter.

The AMU Interface RS232 PCB is used for Logger down load and Firmware up load. For detailed information see the corresponding manual “AMU RS232 Interface”.

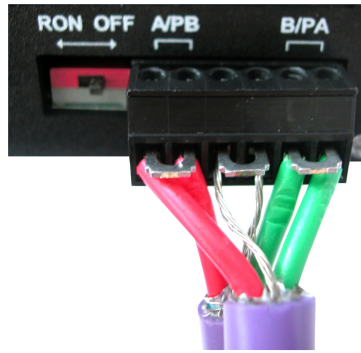
3.12.2 Profibus (optional)



To connect several instruments by means of a network or to configure a PROFIBUS DP connection, consult the PROFIBUS manual. Use appropriate network cable.

NOTICE: *The switch must be ON, if only one instrument is installed, or on the last instrument in the bus*

3.12.3 Modbus (optional)



To connect several instruments by means of a network consult the MODBUS manual. Use appropriate network cable.

NOTICE: *The switch must be ON, if only one instrument is installed, or on the last instrument in the bus*

4. Instrument Setup

1 Switch on power.

2 Let the instrument run-in for 1 h.

4.1. Programming

USP Parameters

Menu 5.1.2 (activate if required)
Set Operating mode to ON
Set the Limit according your requirements.

Sensor parameters

Program all sensor parameters in Menu 5.1.3 <Installation> <Sensors> <Sensor parameters>:
Enter the:

- Cell constant [cm^{-1}]
- Temperature correction [°C]
- Cable length
- Temperature compensation

Cell Constant

Menu 5.1.3.1
The sensor characteristics are printed on the label of each sensor.

SW-xx-xx-xx	ZK = 0.0417	Cell constant
SWAN AG	DT = 0.06 °C	Temperature correction

Temp. Corr

Menu 5.1.3.2
Enter the temperature correction DT printed on the label.

Cable length

Menu 5.1.3.3
Enter the length of the cable between the AMU transmitter and the sensor.

Measuring unit

Menu 5.1.3.4
Set the <Measuring unit> according to your requirements:

- µS/cm
- µS/m

Temp. Compensation

Menu 5.1.4
Choose between:

- none
- Coefficient
- Neutral salts
- High-purity water
- Strong acids
- Strong bases
- Ammonia, Ethanolamine
- Morpholine

External devices

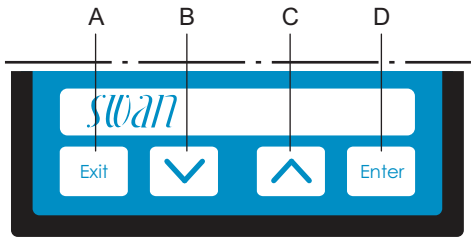
Program all parameters for external devices (interface, recorders, etc.) See program list and explanations 5.2 Signal Outputs, p. 47 and 5.3 Relay Contacts, p. 51.

Limits Alarms

Program all parameters for instrument operation (limits, alarms). See program list and explanations 5.3 Relay Contacts, p. 51.

5. Operation

5.1. Keys



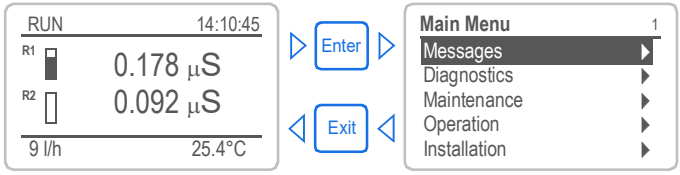
A to exit a menu or command (rejecting any changes)
to move back to the previous menu level

B to move DOWN in a menu list and to decrease digits

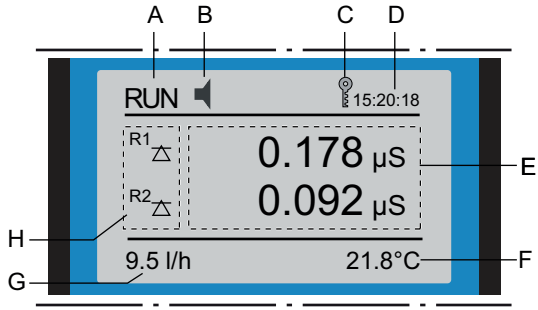
C to move UP in a menu list and to increase digits
to switch between display 1 and 2

D to open a selected sub-menu
to accept an entry

Program Access, Exit



5.2. Display



A RUN — normal operation

HOLD — input closed or cal delay: Instrument on hold (shows status of signal outputs).

OFF — input closed: control/limit is interrupted (shows status of signal outputs).

B ERROR — Error — Fatal Error

C Keys locked, transmitter control via Profibus

D Time

E Process values

F Sample temperature

G Sample flow

H Relay status

Relay status, symbols

upper/lower limit not yet reached

upper/lower limit reached

control upw./downw. no action

control upw./downw. active, dark bar indicates control intensity

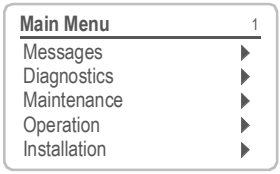
motor valve closed

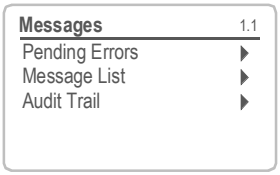
motor valve: open, dark bar indicates approx. position

timer

timer: timing active (hand rotating)

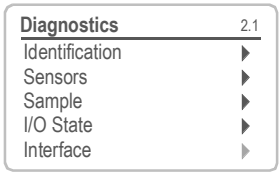
5.3. Software Structure





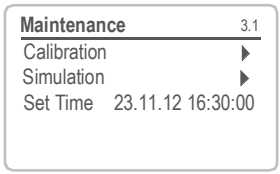
Menu **Messages 1**

Reveals pending errors as well as an event history (time and state of events that have occurred at an earlier point of time).
It contains user relevant data.



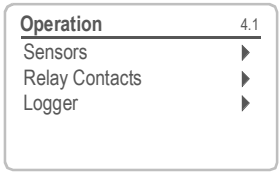
Menu **Diagnostics 2**

Provides user relevant instrument and sample data.



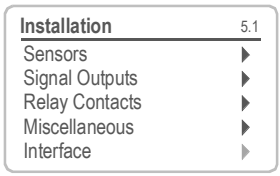
Menu **Maintenance 3**

For instrument calibration, relay and signal output simulation, and to set the instrument time.
It is used by the service personnel.



Menu **Operation 4**

User relevant parameters that might need to be modified during daily routine. Normally password protected and used by the process-operator.
Subset of menu 5 - Installation, but process-related.



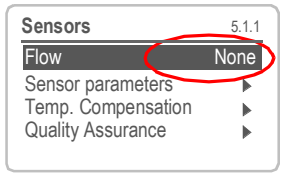
Menu **Installation 5**

For initial instrument set up by SWAN authorized person, to set all instrument parameters. Can be protected by means of password.

5.4. Changing Parameters and values

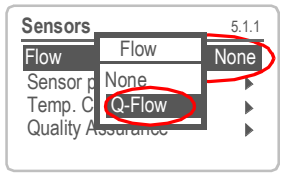
Changing parameters

The following example shows how to set the Q-Flow sensor:



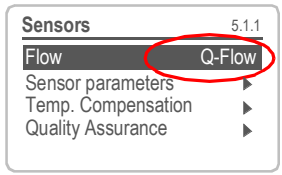
1 Select the parameter you want to change.

2 Press <Enter>



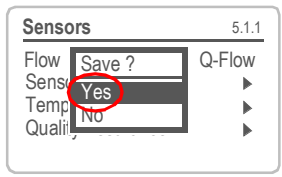
3 Press [▲] or [▼] key to highlight the required parameter.

4 Press <Enter> to confirm the selection or <Exit> to keep the previous parameter).



⇒*The selected parameter is indicated (but not saved yet).*

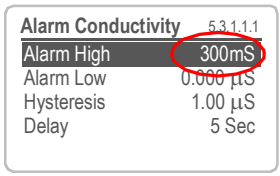
5 Press <Exit>.



⇒*Yes is highlighted.*

6 Press <Enter> to save the new parameter.
⇒*The system reboots, the new parameter is set.*

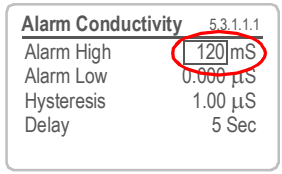
Changing values



1 Select the value you want to change.

2 Press <Enter>.

3 Set required value with [▲] or [▼] key.



4 Press <Enter> to confirm the new value.

5 Press <Exit>.
⇒*Yes is highlighted.*

6 Press <Enter> to save the new value.

6. Maintenance

This section describes the activities intended to retain the instrument in, or to restore it to a state in which it maintains the required or specified performance.

6.1. Maintenance Schedule

WARNING

Stop operation before maintenance.

- Stop sample flow.
- Shut off power of the instrument.

If required	Clean sensor.

Further Maintenance Work

Transmitter check If a test resistor is available, perform a transmitter check.

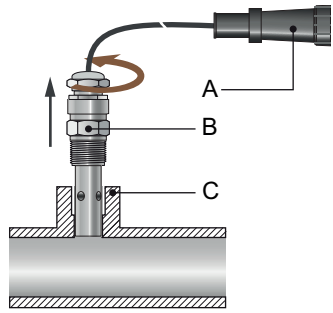
6.2. Stop of Operation for Maintenance

- Shut off power of the instrument.

6.3. Cleaning the sensor

The Swansensor Pharmacon NPT/SAN is largely maintenance-free. Depending on the application, however, the sensor may become contaminated, which can lead to problems.

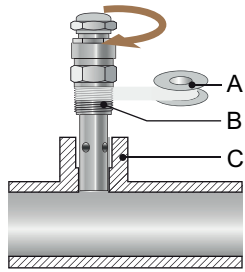
If the sensor is contaminated proceed as follows to clean the sensor.



A *Sensor plug*
B *Conductivity sensor*
C *Pipe flange*

Remove and clean the sensor

1. Disconnect the sensor cable plug [A].
2. Unscrew and remove the sensor [B] from the pipe flange [C] with a 28 mm open-ended spanner.
3. Remove the teflon tape from the sensor thread.
4. Clean the sensor with a small brush or a soft tissue and soapy water.
5. Rinse the sensor well with high purity water.



A *Teflon tape*
B *Conductivity sensor*
C *Pipe flange*

Install the sensor

1. Wrap 7 turns of teflon tape around the sensor thread.
2. Screw the sensor into the pipe flange.
3. Tighten the sensor well with an 28 mm open-ended spanner.

6.4. Alarm function according USP<645>

Display

Set the display to show all available conductivity values, i.e:

- tc: Temperature compensated conductivity
- uc: Uncompensated conductivity
- usp: Conductivity Limit at given temperature

USP Parameter

Operating Mode: set the operating to <On> or <Off>.

Limit: The Limit of the USP limit can be modified from 100% to 20%.
<Installation>/<Sensors>/<USP parameters>.

If the programmed limit is overstepped E015 Error will be issued.

6.5. Transmitter Test

Using high precision test resistors (available as accessory) the transmitter function can be checked.

Test Resistor

Two test plugs consisting of two high precision resistors for conductivity and temperature each.

- Test plug 1:
  1'500 Ω, ±0.1% for temperature (130.45 °C)
  600'000 Ω, ±0.01% for conductivity (0.1333µS/cm)
- Test plug 2:
  1'000 Ω ±0.1% for temperature (0.0 °C)
  10'000 Ω ±0.01% for conductivity (8.0 µS/cm)

NOTICE: *Keep the test resistor kit absolute dry.*

Procedure

Navigate to <Maintenance>/<Transmitter Test> and follow the instructions on the display.

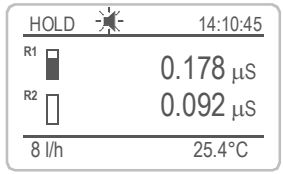
6.6. Longer Stop of Operation

- Stop sample flow.
- Shut off power of the instrument.

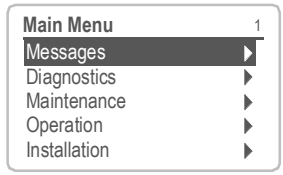
7. Error List

Error
Non-fatal Error. Indicates an alarm if a programmed value is exceeded.
Such Errors are marked **E0xx**.
Fatal Error (blinking symbol)
Control of dosing devices is interrupted.
The indicated measured values are possibly incorrect.
Fatal Errors are divided in the following two categories:

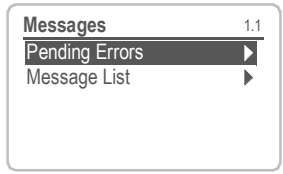
- Errors which disappear if correct measuring conditions are recovered (i.e. Sample Flow low).
  Such Errors are marked **E0xx**
- Errors which indicate a hardware failure of the instrument.
  Such Errors are marked **E0xx**



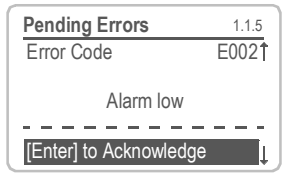
Error or fatal Error
Error not yet acknowledged.
Check **Pending Errors 1.1.5** * and take corrective action.
Press [ENTER].



Navigate to menu Messages.
Press [ENTER].



Navigate to menu Pending Errors.
Press [ENTER].



Press [ENTER] to acknowledge the Pending Errors. The Error is reset and saved in the Message List.

* Menu numbers see Program Overview, p. 38

Error	Description	Corrective action
E001	Cond. Alarm high	– check process – check program value 5.3.1.1, p. 52
E002	Cond. Alarm low	– check process – check program value 5.3.1.1, p. 52
E007	Sample Temp. high	– check sample temperature – check program value 5.3.1.3, p. 52
E008	Sample Temp. low	– check sample temperature – check program value 5.3.1.3, p. 52
E009	Sample Flow high	– check sample flow – check program value 5.3.1.2, p. 52
E010	Sample Flow low	– establish sample flow – clean instrument – check program value 5.3.1.2, p. 52
E011	Temp. shorted	– check wiring of temperature sensor – check temperature sensor
E012	Temp. disconnected	– check wiring of temperature sensor – check temperature sensor
E013	Case Temp. high	– check case/environment temperature – check program value 5.3.1.4, p. 53
E014	Case Temp. low	– check case/environment temperature – check program value 5.3.1.5, p. 53
E015	USP Error	– Measured value above programmed USP limit (% setpoint)
E017	Control Timeout	– check control device or programming in Installation, Relay contact, Relay 1/2 5.3.2/3, p. 53
E018	Quality Assurance	– Perform QA Procedure using reference instrument, e.g. AMI Inspector.

Error	Description	Corrective action
E024	Input active	– See If Fault Yes is programmed in Menu 5.3.4, p. 57
E026	IC LM75	– call service
E030	EEprom Frontend	– call service
E031	Calibration Recout	– call service
E032	Wrong Frontend	– call service
E033	Power-on	– none, normal status
E034	Power-down	– none, normal status

8. Program Overview

For explanations about each parameter of the menus see Program List and Explanations, p. 43.

- Menu 1 **Messages** informs about pending errors and maintenance tasks and shows the error history. Password protection possible. No settings can be modified.
- Menu 2 **Diagnostics** is always accessible for everybody. No password protection. No settings can be modified.
- Menu 3 **Maintenance** is for service: Calibration, simulation of outputs and set time/date. Please protect with password.
- Menu 4 **Operation** is for the user, allowing to set limits, alarm values, etc. The presetting is done in the menu Installation (only for the System engineer). Please protect with password.
- Menu 5 **Installation**: Defining assignment of all inputs and outputs, measuring parameters, interface, passwords, etc. Menu for the system engineer. Password strongly recommended.

8.1. Messages (Main Menu 1)

Pending Errors	*Pending Errors*	1.1.5*	* Menu numbers
1.1*			
Message List	*Number*	1.2.1*	
1.2*	*Date, Time*		
Audit Trail	*Audit Trail*	1.3.1*	
1.3*	*Number, Date, Time*		

8.2. Diagnostics (Main Menu 2)

Identification	Designation	*AMU Pharmacon*		* Menu numbers
2.1*	Version	*V6.21 – 05/18*		
	Factory Test	*Instrument*	2.1.3.1*	
	2.1.3*	*Motherboard*		
		Front End		
	Operating Time	*Years / Days / Hours / Minutes / Seconds*		2.1.4.1*
	2.1.4*			
Sensors	**Cond. Sensor**	*Current Value*		
2.2*	2.2.1*	*(Raw value)*		
		Test History	*Number*	2.2.1.4.1*
		2.2.1.4*	*Date, Time*	
			Deviation Cond.	
			Deviation Temp.	
			Check successful	
		QA History	*Number*	2.2.1.5.1*
		2.2.1.5*	*Date, Time*	
			Deviation Cond.	
			Deviation Temp.	
			Check successful	
	Miscellaneous	*Case Temp.*	2.2.2.1*	
	2.2.2*			
Sample	*Sample ID*	2.3.1*		
2.3*	*Temperatur*			
	(Pt 1000)			
	Sample flow			
	(Raw value)			
I/O State	*Alarm Relay*	2.4.1*		
2.4*	*Relay 1/2*	2.4.2*		
	Input			
	Signal Output 1/2			
Interface	*Protocol*	2.5.1*		
2.5*	*Baud rate*			

8.3. Maintenance (Main Menu 3)

Transmitter Test	*Mount Test*	3.1.5*	* Menu numbers
3.1*	*(Progress)*		
Simulation	*Alarm Relay*	3.2.1*	
3.2*	*Relay 1*	3.2.2*	
	Relay 2	3.2.3*	
	Signal Output 1	3.2.4*	
	Signal Output 2	3.2.5*	
Set Time	*(Date), (Time)*		
3.3*			
Quality Assurance	*Quality Assurance*	3.4.x*	
3.4*	*(Progress)*		

8.4. Operation (Main Menu 4)

Sensors	*Filter Time Const.*	4.1.1*		* Menu numbers
4.1*	*Hold after Cal.*	4.1.2*		
Relay Contacts	**Alarm Relay**	**Alarm Conductivity**	*Alarm High*	4.2.1.1.1*
4.2*	4.2.1*	4.2.1.1*	*Alarm Low*	4.2.1.1.x*
			Hysteresis	4.2.1.1.x*
			Delay	4.2.1.1.x*
	Relay 1/2	*Setpoint*	4.2.x.x*	
	4.2.2* - 4.2.3*	*Hysteresis*	4.2.x.x*	
		Delay	4.2.x.x*	
	Input	*Active*	4.2.4.1*	
	4.2.4*	*Signal Outputs*	4.2.4.2*	
		Output / Control	4.2.4.3*	
		Fault	4.2.4.4*	
		Delay	4.2.4.5*	
Logger	*Log Interval*	4.3.1*		
4.3*	*Clear Logger*	4.3.2*		
Display	**Screen 1**	*Row 1/2/3*	4.4.1.x*	
4.4*	4.4.1*			
	Screen 2	*Row 1/2/3*	4.4.2.x*	
	4.4.2*			

8.5. Installation (Main Menu 5)

Sensors	*Flow*	5.1.1*		* Menu numbers
5.1*	**USP parameters**	*Operating Mode*	5.1.2.1*	
	5.1.2*	*Limit*	5.1.2.2*	
	Sensor parameters	*Cell Constant*	5.1.3.1*	
	5.1.3*	*Temp. Corr.*	5.1.3.2*	
		Cable length	5.1.3.3*	
		Meas. unit	5.1.3.4*	
	Temp. Compensation	*Comp.*	5.1.4.1*	
	5.1.4*			
	Quality Assurance	*Level*	5.1.5.1*	
	5.1.5*	*Deviation Cond.*	5.1.5.2*	
		Deviation Temp.	5.1.5.3*	
		Interval	5.1.5.4*	
Signal Outputs	**Signal Output 1/2**	*Parameter*	5.2.1.1 - 5.2.2.1*	
5.2*	5.2.1* - 5.2.2*	*Current Loop*	5.2.1.2 - 5.2.2.2*	
		Function	5.2.1.3 - 5.2.2.3*	
		Scaling	*Range Low*	5.2.x.40.x*
		5.2.x.40	*Range High*	5.2.x.40.x*
Relay Contacts	**Alarm Relay**	**Alarm Conductivity**	*Alarm High*	5.3.1.1.1*
5.3*	5.3.1*	5.3.1.1*	*Alarm Low*	5.3.1.1.x*
			Hysteresis	5.3.1.1.x*
			Delay	5.3.1.1.x*
		Sample Flow	*Flow Alarm*	5.3.1.2.1*
		5.3.1.2*	*Alarm High*	5.3.1.2.x*
			Alarm Low	5.3.1.2.x*
		Sample Temp.	*Alarm High*	5.3.1.3.1*
		5.3.1.3*	*Alarm Low*	5.3.1.3.x*
		Case Temp. high	5.3.1.4*	
		Case Temp. low	5.3.1.5*	
	Relay 1/2	*Function*	5.3.2.1* - 5.3.3.1*	
	5.3.2* - 5.3.3*	*Parameter*	5.3.2.x* - 5.3.3.x*	
		Setpoint	5.3.2.x* - 5.3.3.x*	
		Hysteresis	5.3.2.x* - 5.3.3.x*	
		Delay	5.3.2.x* - 5.3.3.x*	

	Input	*Active*	5.3.4.1*	* Menu numbers
	5.3.4*	*Signal Outputs*	5.3.4.2*	
		Output/Control	5.3.4.3*	
		Fault	5.3.4.4*	
		Delay	5.3.4.5*	
Miscellaneous	*Language*	5.4.1*		
5.4*	*Set defaults*	5.4.2*		
	Load Firmware	5.4.3*		
	Access	*Administrator*	5.4.4.1*	
	5.4.4*	*User 1-4*	5.4.4.2*- 5.4.4.5*	
	Sample ID	5.4.5*	*Name/Function/Password*	
Interface	*Protocol*	5.5.1*		
5.5*	*Baud Rate*	5.5.x*		

9. Program List and Explanations

1 Messages

1.1 Pending Errors

1.1.5 Provides the list of active errors with their status (active, acknowledged). If an active error is acknowledged, the alarm relay opens again. Cleared errors are moved to the Message list.

1.2 Message List

1.2.1 Shows the error history: Error code, date / time of issue and status (active, acknowledged, cleared). 65 errors are memorized. Then the oldest error is cleared to save the newest error (circular buffer).

1.3 Audit Trail

1.3.1 Shows the audit trail: event, menu, date and time of issue.

2 Diagnostics

In diagnostics mode, the values can only be viewed, not modified.

2.1 Identification

Designation: View the Designation of instrument.
Version: Firmware of instrument (e.g. V6.21–05/18)

2.1.3 **Factory Test**: Test date of the Instrument -, Motherboard - and Frontend quality control factory test.

2.1.4 **Operating Time**: Years / Days / Hours / Minutes / Seconds

2.2 Sensors

2.2.1 **Cond. Sensor:**

Current value: Current conductivity value [µS].
Raw value: Uncompensated current conductivity value [µS].

2.2.1.4 **Test History*:*** Review the transmitter test values (Number, Date,Time, Deviation Conductivity, Deviation Temperature, Test Result) compared to the high precision test resistors.

2.2.1.5 **QA History:** Review QA values (Number, Date, Time, Deviation Conductivity, Deviation Temperature, Status of QA check) of the last quality assurance procedures.

2.2.2 **Miscellaneous**:

2.2.2.1 *Case Temp:* Shows the actual temperature [°C] inside the transmitter.

2.3 Sample

2.3.1 **Sample ID:** Review the programmed code. The code is defined by the user to identify the sample point in the plant.

Temperature: Actual temperature [°C] and [Ohm] (Pt 1000)

Sample flow: Only available if flow meter is used. Sample flow [l/h] and raw value [Hz].

2.4 I/O State

Shows current status of all in- and outputs.

2.4.1/2.4.2

Alarm Relay:	Active or inactive
Relay 1/2:	Active or inactive
Input:	Open or closed
Signal Output 1/2:	Actual current in mA

2.5 Interface

Only available if optional interface is installed.
Review programmed communication settings.

3 Maintenance

3.1 Transmitter Test

3.1.5 Follow the commands on the screen.
See Transmitter Test, p. 34

3.2 Simulation

To simulate a value or a relay state, select the

- alarm relay,
- relay 1/2
- signal output 1/2

with the [▲] or [▼] key.

Press the [Enter] key.

Change the value or state of the selected item with the [▲] or [▼] key.

Press the [Enter] key.

⇒ *The value is simulated by the relay/signal output.*

Alarm Relay:	Active or inactive
Relay 1/2:	Active or inactive
Signal Output 1/2:	The preset current is simulated in mA

At the absence of any key activities, the instrument will switch back to normal mode after 20 min. If you quit the menu, all simulated values will be reset.

3.3 Set Time

Adjust date and time.

4 Operation

4.1 Sensors

4.1.1 *Filter Time Constant:* Used to damp noisy signals. The higher the filter time constant, the slower the system reacts to changes of the measured value.
Range: 5–300 Sec

4.1.2 *Hold after Cal:* Delay permitting the instrument to stabilize again after calibration. During calibration- plus hold-time, the signal outputs are frozen (held on last valid value), alarm values, limits are not active.
Range: 5–6‘000 Sec

4.2 Relay Contacts

See 5.3 Relay Contacts, p. 51

4.3 Logger

The instrument is equipped with an internal logger. The logger data can be downloaded to a PC using the built-in RS232 interface.

The logger can save approx. 1500 data records. Records consist of: Date, time, alarms, measured value, measured value uncompensated, temperature, flow.

4.3.1 *Log Interval:* Select a convenient log interval. Consult the table below to estimate the max logging time. When the login buffer is full, the oldest data record is erased to make room for the newest one. (circular buffer)
Range: 1 Second - 1 hour

Interval	1 s	5 s	1 min	5 min	10 min	30 min	1 h
Time	25 min	2 h	25 h	5 d	10 d	31 d	62 d

4.3.2 *Clear Logger:* If confirmed with **yes**, the complete logger data is deleted. A new data series is started.

4.4 Display

4.4.1-4.4.2 **Screen 1/2**: Assign available measurement values to screen 1 or 2.

4.4.1/2.x *Row 1/2/3:* Assign available measurement values to row 1 to 3 for each screen.
Available values: Conductivity compensated (tc), Conductivity uncompensated (uc) or USP conductivity alarm (usp) or None.

5 Installation

5.1 Sensors

5.1.1 *Flow:* Select “Q-Flow” if the sample flow should be measured using a Swan flow meter.
Available values: Q-Flow or None

5.1.2 **USP parameter:** Alarm (E015) according to limits of USP <645>.

5.1.2.1 *Operating Mode:* Enable USP mode. Available values: off / on

5.1.2.2 *Limit:* Possibility to lower the official USP limits in % of the USP values.
Range: 20–100%

5.1.3 **Sensor parameters:**

5.1.3.1 *Cell Constant:* Enter the cell constant (ZK). It is printed on the label of the used sensor.
Range: 0.005000–11.00 cm^{-1}

5.1.3.2 *Temperature Correction:* Enter the temperature correction (DT). It is printed on the label of the used sensor.
Range: -1.00 to +1.00 °C

5.1.3.3 *Cable length:* Enter the cable length
Range: 0.0–30.0 m

5.1.3.4 *Measuring unit:* Select measuring unit.
Available values: µS/cm or µS/m

5.1.4 **Temp. Compensation:**

5.1.4.1 *Compensation:* Select temperature compensation.
Available values: Coefficient, Neutral salts, High-purity water, strong acids, strong bases, Ammonia, Eth. am., Morpholine or None.

5.1.5 **Quality Assurance:** Switch the Quality Assurance on or off.

5.1.5.1 *Level*: Select quality level:

- Level 0: Off
  Quality assurance procedure switched off. Any additional QA menus are hidden.
- Level 1: Trend
- Level 2: Standard
- Level 3: Crucial
- Level 4: User

Edit user specific limits in menus 5.1.5.2 to 5.1.5.4.

5.2 Signal Outputs

5.2.1 - 5.2.2 **Signal Output 1/2:** Assign process value, the current loop range and a function to each signal output.

5.2.1.1-5.2.2.1 *Parameter:* Assign one of the process values to the signal output. Available values: Conductivity, Temperature, Sample flow, and Conductivity uc

5.2.1.2-5.2.2.2 *Current Loop:* Select the current range of the signal output. Make sure the connected device works with the same current range.

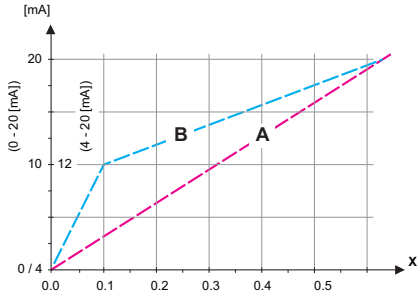
Available ranges: 0–20 [mA] or 4–20 [mA]

5.2.1.3-5.2.2.3 *Function:* Define if the signal output is used to transmit a process value or to drive a control unit.
Available functions are:

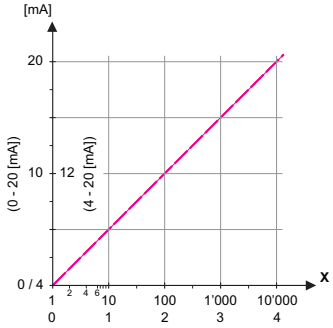
- Linear, bilinear or logarithmic for process values.
  See As process values, p. 48
- Control upwards or control downwards for controllers.
  See As control output, p. 49

As process values

The process value can be represented in 3 ways: linear, bilinear or logarithmic. See graphs below.



A *linear*
B *bilinear*
X *Measured value*



X *Measured value (logarithmic)*

5.2.x.40 **Scaling:** Enter beginning and end point (Range low & high) of the linear or logarithmic scale. In addition, the midpoint for the bilinear scale.

Parameter Conductivity:

5.2.1.40.10 *Range low*: 0 µS–300 mS

5.2.1.40.20 *Range high*: 0 µS–300 mS

Parameter Temperature

5.2.1.40.11 *Range low*: -25 to +270 °C

5.2.1.40.21 *Range high*: -25 to +270 °C

Parameter Sample flow

5.2.1.40.12 *Range low*: 0 –50 l/h

5.2.1.40.22 *Range high*: 0 –50 l/h

Parameter Cond. uc:

5.2.1.40.13 *Range low*: 0 µS–300 mS

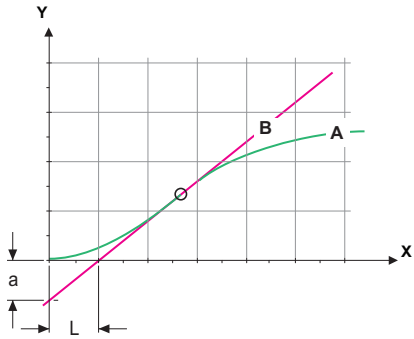
5.2.1.40.23 *Range high*: 0 µS–300 mS

As control output

Signal outputs can be used for driving control units. We distinguish different kinds of controls:

- *P-controller:* The controller action is proportional to the deviation from the setpoint. The controller is characterized by the P-Band. In the steady-state, the setpoint will never be reached. The deviation is called steady-state error.
  Parameters: Setpoint, P-Band
- *PI-controller:* The combination of a P-controller with an I-controller will minimize the steady-state error. If the reset time is set to zero, the I-controller is switched off.
  Parameters: Setpoint, P-Band, reset time.
- *PD-controller:* The combination of a P-controller with a D-controller will minimize the response time to a fast change of the process value. If the derivative time is set to zero, the D-controller is switched off.
  Parameters: Setpoint, P-Band, derivative time.
- *PID-controller:* The combination of a P-, an I - and a D-controller allows a proper control of the process.
  Parameters: Setpoint, P-Band, reset time, derivative time.

Ziegler-Nichols method for the optimization of a PID controller:



A *Response to maximum control output* ***Xp*** *= 1.2/a*
B *Tangent on the inflection point* ***Tn*** *= 2L*
X *Time* ***Tv*** *= L/2*

The point of intersection of the tangent with the respective axis will result in the parameters a and L.

Consult the manual of the control unit for connecting and programming details. Choose control upwards or downwards.

Control upwards or downwards

Setpoint: User-defined process value for the selected parameter.

P-Band: Range below (upwards control) or above (downwards control) the set-point, within the dosing intensity is reduced from 100% to 0% to reach the setpoint without overshooting.

5.2.1.43 **Control Parameters**: if Parameters = Conductivity

5.2.1.43.10 *Setpoint*
Range: 0.000 µS–300 mS

5.2.1.43.20 *P-Band*:
Range: 0.000 µS–300 mS

5.2.1.43 **Control Parameters**: if Parameters = Temperature

5.2.1.43.11 *Setpoint*
Range: -25 to +270 °C

5.2.1.43.21 *P-Band*:
Range: -25 to +270 °C

5.2.1.43 **Control Parameters**: if Parameters = Sample flow

5.2.1.43.12 *Setpoint*
Range: 0 –50 l/h

5.2.1.43.22 *P-Band*:
Range: 0 –50 l/h

5.2.1.43 **Control Parameters**: if Parameters = Cond. uc.

5.2.1.43.13 *Setpoint*
Range: 0 µS–300 mS

5.2.1.43.23 *P-Band*:
Range: 0 µS–300 mS

5.2.1.43.3 *Reset time:* The reset time is the time till the step response of a single I-controller will reach the same value as it will be suddenly reached by a P-controller.
Range: 0–9'000 sec

5.2.1.43.4 *Derivative time:* The derivative time is the time till the ramp response of a single P-controller will reach the same value as it will be suddenly reached by a D-controller.
Range: 0–9'000 sec

5.2.1.43.5 *Control timeout:* If a controller action (dosing intensity) is constantly over 90% during a defined period of time and the process value does not come closer to the setpoint, the dosing process will be stopped for safety reasons.
Range: 0–720 min

5.3 Relay Contacts

5.3.1 **Alarm Relay:** The alarm relay is used as cumulative error indicator. Under normal operating conditions the contact is active.

The contact is inactive at:

- Power loss
- Detection of system faults like defective sensors or electronic parts
- High case temperature
- Lack of reagents
- Process values out of programmed ranges.

Program alarm levels, hysteresis values and delay times for the following parameters.

- Alarm Conductivity
- Sample Flow

- Sample Temp.
- Case Temp. high
- Case Temp. low

5.3.1.1 Alarm Conductivity

5.3.1.1.1 *Alarm High:* If the measured value rises above the alarm high value, the alarm relay is activated and E001 is displayed in the message list.
Range: 0.000 µS–300 mS

5.3.1.1.x *Alarm Low:* If the measured value falls below the alarm low value, the alarm relay is activated and E002 is displayed in the message list.
Range: 0.000 µS–300 mS

5.3.1.1.x *Hysteresis:* Within the hyst. range, the relay does not switch. This prevents damage of relays contacts when the measured value fluctuates around the alarm value.
Range: 0.000 µS–300 mS

5.3.1.1.x *Delay:* Duration, the activation of the alarm relay is retarded after the measuring value has risen above/fallen below the programmed alarm.
Range: 0–28‘800 Sec

5.3.1.2 Sample Flow: Define at which sample flow a flow alarm should be issued.

5.3.1.2.1 *Flow Alarm:* Program if the alarm relay should be activated if there is a flow alarm. Choose between yes or no. The flow alarm will always be indicated in the display, pending error list, saved in the message list and the logger. Available values: Yes or no

> ***NOTICE:*** *Sufficient flow is essential for a correct measurement. We recommend to program yes.*

5.3.1.2.x *Alarm High:* If the measuring values rises above the programmed value E009 will be issued.
Range: 10.0–50.0 l/h

5.3.1.2.x *Alarm Low:* If the measuring values falls below the programmed value E010 will be issued.
Range: 0.0–9.0 l/h

5.3.1.3 Sample temperature: Define the measuring value, which should issue an alarm high respectively low.

5.3.1.3.1 *Alarm High:* If the sample temperature rises above the programmed value E007 is issued.
Range: 30–200 °C

5.3.1.3.x *Alarm Low:* If the sample temperature falls below the programmed value E008 is issued.
Range: -10 to +20 °C

5.3.1.4 *Case Temp. high:* Set the alarm high value for temperature of electronics housing. If the value rises above the programmed value E013 is issued.
Range: 30–75 °C

5.3.1.5 *Case Temp. low:* Set the alarm low value for temperature of electronics housing. If the value falls below the programmed value E014 is issued.
Range: -10 to +20 °C

5.3.2/3 **Relay 1 and 2:** The function of relay contacts 1 or 2 is defined by the user.

NOTICE: *The navigation in the menu <Relay 1> and <Relay 2> is equal. For reason of simplicity only the menu numbers of Relay 1 are used in the following.*

1 First select the functions as:
- Limit upper/lower,
- Control upwards/downwards,
- Timer
- Fieldbus

2 Then enter the necessary data depending on the selected function.

5.3.2.1 Function = Limit upper/lower:

When the relays are used as upper or lower limit switches, program the following:

5.3.2.20 *Parameter:* select a process value

5.3.2.300 *Setpoint*: If the measured value rises above respectively falls below the set-point, the relay is activated.

Parameter	**Range**
Conductivity	0 µS–300 mS
Temperature	-25 to +270 °C
Sample flow	0–50 l/h
Cond. uc	0 µS–300 mS

5.3.2.400 *Hysteresis:* within the hysteresis range, the relay does not switch. This prevents damage of relay contacts when the measured value fluctuates around the alarm value.

Parameter	Range
Conductivity	0 µS–300 mS
Temperature	-25 to +270 °C
Sample flow	0–50 l/h
Cond. uc	0 µS–300 mS

5.3.2.50 *Delay:* Duration, the activation of the alarm relay is retarded after the measuring value has risen above/fallen below the programmed alarm.
Range. 0–600 Sec

5.3.2.1 Function = Control upwards/downwards:

The relays may be used to drive control units such as solenoid valves, membrane dosing pumps or motor valves. When driving a motor valve both relays are needed, relay 1 to open and relay 2 to close the valve.

5.3.2.22 *Parameter:* Choose on of the following process values.

- Conductivity)
- Temperature
- Sample Flow
- Cond. uc

5.3.2.32 **Settings***:* Choose the respective actuator:

- Time proportional
- Frequency
- Motor valve

5.3.2.32.1 Actuator = Time proportional

Examples of metering devices that are driven time proportional are solenoid valves, peristaltic pumps.

Dosing is controlled by the operating time.

5.3.2.32.20 *Cycle time:* duration of one control cycle (on/off change).
Range: 0–600 sec.

5.3.2.32.30 *Response time:* Minimal time the metering device needs to react.
Range: 0–240 sec.

5.3.2.32.4 **Control Parameters**
Range for each Parameter same as 5.2.1.43, p. 50

5.3.2.32.1 Actuator = Frequency

Examples of metering devices that are pulse frequency driven are the classic membrane pumps with a potential free triggering input. Dosing is controlled by the repetition speed of dosing shots.

5.3.2.32.21 *Pulse frequency:* Max. pulses per minute the device is able to respond to. Range: 20–300/min.

5.3.2.32.31 **Control Parameters**
Range for each Parameter same as 5.2.1.43, p. 50

5.3.2.32.1 Actuator = Motor valve

Dosing is controlled by the position of a motor driven mixing valve.

5.3.2.32.22 *Run time:* Time needed to open a completely closed valve
Range: 5–300 Sec.

5.3.2.32.32 *Neutral zone:* Minimal response time in % of the runtime. If the requested dosing output is smaller than the response time, no change will take place.
Range: 1–20 %

5.3.2.32.4 **Control Parameters**
Range for each Parameter same as 5.2.1.43, p. 50

5.3.2.1 Function = Timer:

The relay will be closed repetitively depending on the programmed time scheme.

5.3.2.24 *Mode:* Operating mode (interval, daily, weekly)

5.3.2.24 *Interval*

5.3.2.340 *Interval:* The interval can be programmed within a range of 1–1440 min.

5.3.2.44 *Run Time*: Enter the time the relay stays closed.
Range: 5–6000 sec.

5.3.2.54 *Delay*: during run time plus the delay time the signal and control outputs are held in the operating mode programmed below.
Range: 0–6'000 Sec.

5.3.2.6 *Signal Outputs*: Select operating mode of the signal output:

Cont.: Signal outputs continue to issue the measured value.

Hold: Signal outputs hold the last valid measured value. Measurement is interrupted. Errors, except fatal errors, are not issued.

Off: Signal outputs are switched off (set to 0 or 4 mA). Errors, except fatal errors, are not issued.

5.3.2.7 *Output/Control*: Select operating mode of the controller output:

Cont.: Controller continues normally.

Hold: Controller continues based on the last valid value.

Off: Controller is switched off.

5.3.2.24 *daily*

The relay contact can be closed daily, at any time of a day.

5.3.2.341 *Start time*: to set the start time proceed as follows:

1 Press [Enter], to set the hours.

2 Set the hour with the [▲] or [▼] keys.

3 Press [Enter], to set the minutes.

4 Set the minutes with the [▲] or [▼] keys.

5 Press [Enter], to set the seconds.

6 Set the seconds with the [▲] or [▼] keys.

Range: 00:00:00–23:59:59

5.3.2.44 *Run Time*: see Interval

5.3.2.54 *Delay*: see Interval

5.3.2.6 *Signal Outputs*: see Interval

5.3.2.7 *Output/Control*: see Interval

5.3.2.24 *weekly*

The relay contact can be closed at one or several days, of a week. The daily starting time is valid for all days.

5.3.2.342 **Calendar**:

5.3.2.342.1 *Start time*: The programmed start time is valid for each of the programmed days. To set the start time see 5.3.2.341, p. 56.
Range: 00:00:00–23:59:59

5.3.2.342.2 *Monday*: Possible settings, on or off

to

5.3.2.342.8 *Sunday*: Possible settings, on or off

5.3.2.44 *Run Time*: see Interval

5.3.2.54 *Delay*: see Interval

5.3.2.6 *Signal Outputs*: see Interval

5.3.2.7 *Output/Control*: see Interval

5.3.2.1 Function = Fieldbus:

The relay will be switched via the Profibus input. No further parameters are needed.

5.3.4 **Input:** The functions of the relays and signal outputs can be defined depending on the position of the input contact, i.e. no function, closed or open.

5.3.4.1 *Active:* Define when the input should be active:

No:	Input is never active.
When closed	Input is active if the input relay is closed
When open:	Input is active if the input relay is open

5.3.4.2 *Signal Outputs:* Select the operation mode of the signal outputs when the relay is active:

Cont.:	Signal outputs continue to issue the measured value.
Hold:	Signal outputs issue the last valid measured value. Measurement is interrupted. Errors, except fatal errors, are not issued.
Off:	Set to 0 or 4 mA respectively. Errors, except fatal errors, are not issued.

5.3.4.3 *Output/Control:* (relay or signal output):

Cont.	Controller continues normally.
Hold	Controller continues on the last valid value.
Off	Controller is switched off.

5.3.4.4 *Fault:*

No:	No message is issued in pending error list and the alarm relay does not close when input is active. Message E024 is stored in the message list.
Yes:	Message E024 is issued and stored in the message list. The Alarm relay closes when input is active.

5.3.4.5 *Delay:* Time which the instrument waits, after the input is deactivated, before returning to normal operation.
Range: 0–6'000 sec

5.4 Miscellaneous

5.4.1 *Language:* Set the desired language.
Available settings: German / English / French / Spanish

5.4.2 *Set defaults:* Reset the instrument to factory default values in three different ways:

- **Calibration**: Sets calibration values back to default. All other values are kept in memory.
- **In parts**: Communication parameters are kept in memory. All other values are set back to default values.
- **Completely**: Sets back all values including communication parameters.

5.4.3 *Load Firmware:* Firmware updates should be done by instructed service personnel only.

5.4.4 **Access:** Select a password different from 0000 to prevent unauthorized access to the menus "Messages", "Maintenance", "Operation" and "Installation".

User: Edit name of the five available users (Administrator, User 1–4).

Function: Edit the function of each user. Available functions are:

- Administrator (all menus)
- Operator (Messages, Diagnostics)
- Service (Messages, Diagnostics, Maintenance, Operation)

Each menu may be protected by a *different* password.

If you forgot the passwords, contact the closest SWAN representative.

5.4.5 *Sample ID:* Identify the process value with any meaningful text, such as the KKS number.

5.5 Interface

Select one of the following communication protocols. Depending on your selection, different parameters must be defined.

5.5.1	*Protocol:* **Profibus**	
5.5.20	Device address:	Range: 0–126
5.5.30	ID No.:	Range: Analyzer; Manufacturer; Multivariable
5.5.40	Local operation:	Range: Enabled, Disabled
5.5.1	*Protocol:* **Modbus RTU**	
5.5.21	Device address:	Range: 0–126
5.5.31	Baud Rate:	Range: 1200–115200 Baud
5.5.41	Parity:	Range: none, even, odd
5.5.1	*Protocol:* **Hyper Terminal**	
5.5.23	Baud Rate:	Range: 1200–115200 Baud

10. Default Values

Operation:

Sensors	Filter Time Const.:	10 s
	Hold after Cal.:	300 s
Alarm Relay		same as in Installation
Signal Output		same as in Installation
Relay 1/2		same as in Installation
Input		same as in Installation
Logger	Logger Interval:	30 min
	Clear Logger:	no

Installation:

Sensor	Flow:	None
	USP parameters: Operating Mode:	off
	USP parameters: Limit:	100%
	Sensor parameters: Cell Constant:	0.08000 cm^{-1}
	Sensor parameters: Temp. corr.:	0.00 °C
	Sensor parameters: Cablel lenght:	0.0 m
	Sensor parameters: Meas. unit:	µS/cm
	Temp. Compensation: Comp.	none
	Quality Assurance: Level 0:	off
Signal Output 1/2	Parameter:	Conductivity
	Current loop:	4 - 20 mA
	Function:	linear
	Scaling: Range low:	0.000 µS
	Scaling: Range high:	1.00 mS
	Scaling: Temperature: Range low:	0.0 °C
	Scaling: Temperature: Range high:	50.0 °C
	Scaling: Conductivity uc: Range low:	0.000 µS
	Scaling: Conductivity uc: Range high:	1.00 mS
	Scaling: Sample Flow: Range low:	0 l/h
	Scaling: Sample Flow: Range high:	200 l/h
Alarm Relay	Alarm Conductivity: Alarm high:	300 mS
	Alarm Conductivity: Alarm low:	0.000 µS
	Alarm Conductivity: Hysteresis:	1.00 µS
	Alarm Conductivity: Delay:	5 s
	Sample Flow: Flow Alarm:	yes
	Sample Flow: Alarm High:	20 l/h
	Sample Flow: Alarm Low:	5 l/h
	Sample Temp.: Alarm High:	160 °C
	Sample Temp.: Alarm Low:	0 °C

	Case temp. high: ..... 65 °C
	Case temp. low: ..... 0 °C
Relay 1/2	Function: ..... Limit upper
	Parameter: ..... Conductivity
	Setpoint: ..... 30 mS
	Hysteresis: ..... 10.0 µS
	Delay: ..... 30 s
	If Function = Control upw. or dnw:
	Parameter: ..... Conductivity
	Settings: Actuator: ..... Frequency
	Settings: Pulse Frequency: 120/min
	Settings: Control Parameters: Setpoint: ..... 30 mS
	Settings: Control Parameters: P-band: ..... 10.0 µS
	Settings: Control Parameters: Reset time: ..... 0 s
	Settings: Control Parameters: Derivative Time: ..... 0 s
	Settings: Control Parameters: Control Timeout: ..... 0 min
	Settings: Actuator: ..... Time proportional
	Cycle time: ..... 60 s
	Response time: ..... 10 s
	Settings: Actuator ..... Motor valve
	Run time: ..... 60 s
	Neutral zone: 5%
	If Function = Timer:
	Mode: Interval: ..... 1 min
	Mode: daily/weekly: ..... Starting time: 00:00:00
	Run time: ..... 10 s
	Delay: ..... 5 s
	Signal output: ..... cont
	Output/Control: ..... cont
Input:	Active ..... when closed
	Signal Outputs ..... hold
	Output/Control ..... off
	Fault ..... no
	Delay ..... 10 s
Miscellaneous	Language: ..... English
	Set default: ..... no
	Load firmware: ..... no
	Password: ..... for all modes 0000
	Sample ID: ..... - - - - - - - -
Interface	Protocol: ..... Hyperterminal

11. Index

12. Notes

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- High Purity Water
- Feedwater, Steam and Condensate
- Potable Water
- Pool and Sanitary Water
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